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ABSTRACT

This research investigated factors affecting children's health, based on empirical analyses of data from Washington, D.C. and national data. By most measures, poor children experience disproportionate morbidity and mortality. Yet certain ear and vision problems exhibit a U-shaped relation to family income in both national statistics and the Washington sample. Analyses of this relation suggested crowded housing and limited access to care as possible causes of higher prevalences among poor children in the study sample; mechanisms for the affluent were unclear. Additional analyses identified various economic factors underlying apparent racial differences in children's anemia. Focusing on ambulatory care, the research found different patterns of health outcomes and service utilization across practice settings. Thus, although lower utilization seemed detrimental to poor children's health overall, utilization levels across settings evidently had less to do with these health outcomes than did other provider or system features. Finally, both national and study data revealed persisting inequalities in measures of utilization and barriers to access. In the study sample, the most significant barriers appeared to be low income practices, high provider charges, and absence of Medicaid. Findings suggest that current policy trends may exacerbate present deficiencies in illness prevention and early diagnosis among the disadvantaged. (Author)

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Stanford Univ., CA

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ABSTRACT

This research investigated factors affecting children's health, based on empirical analyses of data from Washington, D.C. and national data. By most measures, poor children experience disproportionate morbidity and mortality. Yet certain ear and vision problems exhibit a U-shaped relation to family income in both national statistics and the Washington sample. Analyses of this relation suggested crowded housing and limited access to care as possible causes of higher prevalences among poor children in the study sample; mechanisms for the affluent were unclear. Additional analyses indentified various economic factors underlying apparent racial differences in children's anemia. Focusing on ambulatory care, the research found different patterns of health outcomes and service utilization across practice settings. Thus, although lower utilization seemed detrimental to poor children's health overall, utilization levels across settings evidently had less to do with these health outcomes than did other provider or system features. Finally, both national and study data revealed persisting inequalities in measures of utilization and barriers to access. In the study sample, the most significant barriers appeared to be low income practices, high provider charges, and absence of Medicaid. Findings suggest that current policy trends may exacerbate present deficiencies in illness prevention and early diagnosis among the disadvantaged.

Foreword

This is the first systematic comparison of different types of ambulatory care delivery systems with regard to their impact on receipt of care and health status. Factors affecting children's health, based on empirical analyses of data from Washington, D. C. as well as national data, were the primary concern of this investigation. The study provides clear evidence that certain types of facilities and payment mechanisms influence the nature and outcome of care when important sociodemographic characteristics of the population are controlled. Although much has been done to alleviate inequalities in utilization and to remove barriers to access, the study data reveal a persistence of these problems among the disadvantaged. The findings of this study have already reached the scientific literature through separate publications as noted in the list of references and are also partially contained in a volume available to policymakers (the Select Panel Report). Therefore, the purpose of this volume is to provide a cohesive and readable summary of the highly technical material contained in that set of papers which will be useful to policymakers and others interested in the health problems of the disadvantaged. In addition, it is hoped that this research will provide encouragement and direction for subsequent investigations in this area.

I. HEALTH ISSUES AND RESEARCH QUESTIONS ADDRESSED

The objective of this research was to increase understanding of the factors which affect children's health. It dealt with two interrelated areas: the role of social conditions and various aspects of socio-economic status as determinants of health; and differential access to and quality of health care. The research was based mainly on an unusually comprehensive data set collected in Washington, D.C. in 1971. It has led to three published studies (Dutton, 1979a, 1979b; Dutton and Silber, 1980), and two manuscripts in preparation (Dutton, 1982a, 1982b); work on patient satisfaction is currently in progress. It also included a related review of national evidence and new analyses of national survey data to complement the more detailed results from the Washington, D.C. sample (Dutton, 1981).

This summary highlights the major findings from these investigations. Specific issues addressed within the two areas include:

A. The Determinants of Children's Health: the distribution of children's morbidity, mortality, and unmet medical needs by income and race; the magnitude and causes of income-related differences in children's ear, hearing, and vision problems; and the socioeconomic factors underlying racial differences in children's hematocrit values used to diagnose anemia.

B. Differential Access to Services and Quality of Care: children's health outcomes in six widely-varying types of ambulatory settings; patterns of service utilization in the same settings taking patient group differences into account; the effects of particular financial, organizational and professional characteristics on utilization; and the distribution of various access barriers nationally and their impact on the poor and minorities.

These issues have important implications for policy, especially in the current period of reductions in Medicaid and other publicly-funded health programs for the disadvantaged. Over the last two decades, such programs have resulted in significant gains in health and medical care among the poor. Indeed, increases in aggregate physician utilization rates have led some observers to conclude that the central problem is no longer inadequate access, but rather excess use. Even the relation between poverty and health has been challenged. Underlying this shifting focus, however, are some larger issues and related political responses. The mounting pressure to control medical care costs and the rise in public sentiment against government programs in general, in particular the Great Society programs of the sixties, all point toward reductions in federal funding for health care. Evidence that income-related differences in health are relatively minor provides a rationale for reducing government funding of programs for the poor. Likewise, evidence that the major access problems have been solved serves as an argument against comprehensive national health insurance.

It is important to understand the political context in which these issues are being debated, because varying interpretations of the evidence lead to divergent conclusions. Findings from this research illustrate the continuing influence of socioeconomic status on children's health and demonstrate numerous problems in both the quantity and quality of health care for disadvantaged groups. The causes and consequences of these problems must be addressed in any successful strategy for controlling costs and increasing the efficiency of health care.

II. DATA AND METHODS

National Data Sources

The review of national data included information from published surveys as well as findings from smaller scale studies. It also reported previously unpublished information from the National Health Interview Survey conducted by the National Center for Health Statistics, D.H.H.S., and new analyses of data from the 1976 national survey conducted by the Center for Health Administration Studies of the University of Chicago (see Aday, et al., 1980, for the original report of this survey).

Washington, D.C. Sample

The Washington, D.C. sample was collected under the auspices of the Institute of Medicine in 1970-71. The methodology and findings of this study are reported in Kessner and Kalk, 1973; and Kessner, et al., 1974. The present research extended the original report by addressing a number of additional topics and by using several types of multivariate statistical methods. These methods permitted more comprehensive analysis of patterns of health status and utilization as well as a more detailed assessment of their determinants.

This research drew upon three linked data sources: a household interview survey; a survey of providers identified by the households as usual sources of health care; and independent clinical examinations of children in the households performed by study physicians.

The household survey was conducted in two geographic areas of Washington, D.C., to obtain a range of income levels and sources of health care. It provided extensive information on the family unit, and also measures of reported utilization and health status for all family members, both children and adults. The present research dealt with a subset of the original sample which included 681 families, containing 1,623 adults and 1,435 children. Although it excluded persons with no regular source of care (less than 10 percent of the sample), this subset closely resembled the original sample on other key factors such as socioeconomic status and illness levels.

Data on the usual providers came from a separate survey of all regular sources of medical care mentioned in the household interviews. Information was obtained on individual physicians and on the practice as a whole. The subsample of providers analyzed included 70 solo practitioners, 15 fee-for-service groups, three prepaid group clinics (all belonging to a single prepaid plan), four hospital pediatric outpatient departments, one emergency room, and 16 public clinics (city and volunteer well-child and family clinics). A single usual provider was identified for each family member, based on the regular sources of care listed and the utilization reported in the household interview.

Clinical examinations were performed by specially-trained study physicians following carefully designed and validated protocols. Children were examined for various conditions depending on age. In the present research, these conditions were defined as follows:

(1) Anemia (ages 6 months through 3 years). Hematocrit values were obtained from fingertip blood specimens. Values more than one standard deviation below the average for the relevant age-sex group were defined as anemic. Data were available for 282 children.

(2) Ear Disease (ages 6 months to 11 years). Comprehensive, ear, nose and throat examinations were performed by qualified otolaryngologists. Problems included various acute and chronic abnormalities; serous otitis media accounted for more than half of all diagnoses. Data were available for 1,063 children. (See Appendix A for the separate definitions of acute ear infections and chronic ear problems.)

(3) Hearing Loss (ages 4 years through 11 years). Hearing loss was based on the combined results of pure-tone screening and threshold tests, and was defined as unilateral or bilateral failure to respond to 15 dB tones in the speech and high range frequencies and 20 dB tones in low range frequencies. Children with acute ear infections were excluded from all analyses of hearing loss. Data were available for 836 children.

(4) Vision Problems (ages 4 years through 11 years). Eye examinations identified three types of disorders: distance vision acuity deficiency (tested with children wearing their usual eyeglasses), motility defects, and organic problems. Distance acuity deficiency, by far the most common disorder, was defined as 20/40 in the poorer eye for children 4-7 years old, and 20/30 in the poorer eye for children 8-11 years old. A summary measure indicated the presence of one or more of the three disorders. Data were available for 840 children.

Methods of Analysis

The research employed various types of analytic methods, including contingency table analysis, analysis of variance, multiple regression, and path analysis. Many parts of the research relied on one or more of the multivariate techniques, because of their ability to distinguish the separate effects of multiple, interrelated variables. The objectives of each technique are somewhat different. Briefly, contingency tables show the association between the frequencies of two or more variables. Analysis of variance indicates whether the mean values of a given measure are signficantly different among specified subgroups of a sample (for example, whether average illness levels are significantly different among children using different health care settings). Multiple regression estimates the individual effects of a specified set of ("independent") variables on another ("dependent") variable; thus, each estimated effect represents the independent impact that a change in that particular variable would have on the dependent variable if all of the other independent variables remained constant. Finally, path analysis divides a total association between two variables into direct (or "independent") and indirect effects, and traces the indirect effects of one variable on the other through various "mediating" variables. This method requires various assumptions, including some knowledge of the basic causal structure among variables of interest. Each of these methods has both strengths and weaknesses. In choosing among them, the most important consideration was to achieve the best match possible between the research question to be investigated and the technique used for investigation.

The coding and mean values of all variables analyzed are listed in Appendices A-C. Appendix A contains the dependent variables used in the multiple regression and path analyses, and lists the amount of variance explained (R^2) by the relevant estimating equations.

Limitations in Data and Methods

Attention should be called to a number of important limitations in both the Washington, D.C. study sample and methods of analysis. The data were collected in a single city with an atypical racial composition. The sample was about 90 percent black. In some cases, the analyses were restricted to blacks. In other cases, the effects of race were taken into account statistically, but the results may still reflect patterns that are more characteristic of black than of white populations. Because of the neighborhoods sampled, income levels were higher than the Washington, D.C. average. As shown in Table 1, the sample income distribution fell somewhere between the black urban average and the overall U.S. urban average.

The sample of providers also appeared to resemble national data with regard to many characteristics, although it contained a much higher proportion of black physicians. Since it consisted of regular sources mentioned in the household interviews rather than a random sample of sources, the providers representing each type of setting were not necessarily typical of Washington as a whole or of other locales. The patient groups using different settings varied substantially, due to both voluntary and involuntary "self-selection." While a number of patient characteristics were included in analyzing the impact of providers and settings to control statistically for patient-group differences, the findings may still be confounded by factors not represented in the data.

To study the effects of different usual sources of care, a single "usual" provider was identified for each family member, even when multiple sources were listed. However, the bulk of reported visits were with the identified usual providers, and 80 percent of persons with visits in the six months prior to the survey had seen only their usual provider. Another simplifying assumption necessary in order to estimate the influence of these sources on rates of utilization and illness was that most people had used the same type of provider or setting for some time. Finally, although the total sample size was quite large, the number of children included in some of the disease-specific analyses of outcomes in different settings was rather small.

Many of the analyses were at least partly exploratory and require further confirmation before generalization is warranted. And, since the data were cross-sectional, inferences about longitudinal effects (say, changes in morbidity that would result from a change in health care organization) must be tentative. The magnitudes of many of the estimated effects, especially those involving health status, were predictably small, and statistical significance levels correspondingly low. Thus, lower significance levels ($p < .10$ or $.20$) were also noted along with the more conventional levels of .05 and .01. Consideration of multiple measures of both use and illness allowed systematic patterns to be revealed in the results, which also increased the likelihood of detecting relatively small effects.

Table 1. Distribution of Families by 1969 Annual Family Income: U.S. Urban Areas and Study Subsample

1969 Income	U.S. Urban Areas-Total*	U.S. Urban Areas-Black*	Study Subsample
Under $3,000	8.7%	19.7%	9.9%
$3,000- $4,999	8.9	15.9	12.5
$5,000- $6,999	10.9	15.7	19.1
$7,000- $9,999	20.0	19.8	19.2
$10,000-$14,999	28.0	18.6	23.8
$15,000 or more	23.3	10.4	15.6
TOTAL	100.0%	100.0%	100.0%

* Source: Bureau of the Census: Consumer Income, Current Population Reports, U.S. Department of Commerce, Washington, D.C., Series P-60, No. 72, August 14, 1970.

To control for as many confounding factors as possible, quite a large number of independent variables were included in the multiple regression analyses. The most feasible method of estimation was thus Ordinary Least Squares (OLS). For dichotomous and limited-range dependent variables, a nonlinear method would have been more appropriate, but selected analyses from this and other studies indicated that the major substantive results using OLS were similar or identical to those based on other methods.

Another possible source of bias was intra-family correlations in analyses of family members. Since the original sampling unit was households rather than individuals, these member analyses were actually based on cluster samples and not simple random samples. Such correlations would be highest for low income families, which tended to have the most members, and may have led to biased estimates and inflated levels of significance. However, in a comparable study, these problems were investigated and appeared to be minimal (Richardson, 1971).

Finally, the variables included in the multivariate analyses explained relatively little (R^2s ranged from 4-29%) of the total variation in illness and in utilization, even though they included most of the major categories studied by previous investigators. While such levels of explanatory power are comparable to or higher than those in most analyses based on cross-sectional, individual observations, they indicate that the estimated equations provided only a partial explanation for these findings. Yet this does not necessarily diminish the credibility of the significant relationships identified; the validity of estimates depends on the inclusion of relevant (potentially confounding) variables in the estimating equation.

Despite these qualifications, the analytic methods employed are among the most technically appropriate, and the study sample is exceptionally rich. Few other data sets link separate surveys of relatively large numbers of both patients and their usual providers with independently-conducted clinical diagnoses of specific health problems. The population-based design permits investigation of many topics, including the determinants of children's health, patterns of patient utilization, health outcomes in different ambulatory settings, the barriers that obstruct access, and the provider and system features that influence follow-up care. Although the data are eleven years old, the health care settings from which they were obtained represent all of the major current sources of ambulatory care. Furthermore, many of the patterns of access and illness observed in the study sample were similar to national patterns, which have remained largely unchanged over the last decade.

III. FINDINGS

A. The Determinants of Children's Health

1. Income and Race Differentials in Children's Health and Access to Care: National Data

National data reveal a significant gap between the health status of poor and minority children compared with the rest of the population (Dutton, 1981). Poor children have the highest rates of nutritional deficiencies, developmental disabilities, and clinical disorders; the lowest general health status as reported by parents; the greatest proportion of school loss days because of illness; and the highest rates of hospitalization and death. There is a direct link between inadequate medical care and certain health problems. Nationally, immunization rates for measles and rubella are lower in poverty areas than in nonpoverty areas, and the prevalence of infections is correspondingly higher. In a diphtheria epidemic in San Antonio, Texas, poor and minority children suffered twelve times as much disease as children who were white and affluent (CHAP, 1979). Although disadvantaged groups have clearly gained greater access to medical care over the last decade, many disparities remain. Poor and minority children receive far less preventive care than other children, are less likely to see a doctor for any reason (especially relative to measures of medical need), and are more seriously ill when they do get care (Dutton, 1981).

2. The U-Shaped Relation between Income and Selected Children's Health Problems

An increasing share of children's medical care is being devoted to health problems which are relatively minor medically, but which may significantly affect children's coping and development. Such problems include learning difficulties, behavioral disturbances, allergies, speech difficulties and visual problems (Haggerty, et al., 1975). Neither the distribution nor the etiology of these problems is well understood, but many do not appear to exhibit the traditional association with poverty. Data from the National Health Examination Survey indicate that a few of these conditions, such as certain clinically-diagnosed visual acuity defects and eardrum abnormalities as well as parent-reported earaches, are associated with both poverty and affluence--that is, they are more common among both high and low income children than among those from middle income families. The mechanisms responsible for this peculiar pattern are unknown.

In the Washington, D.C. study sample, the prevalences of middle ear disease, hearing loss, and vision problems ranged between 15 and 25 percent, levels comparable to those for corresponding measures in national samples of both black and white children. These prevalences also displayed a U-shaped relation to family income similar to that in national data. Since these problems were identified in independent clinical examinations conducted by study physicians, they did not depend on children's access to care or on diagnosis by the usual provider. One of the major questions explored in this research was thus why this U-shaped pattern occurred, and whether the same or different factors were associated with increased prevalences among high and low income children (Dutton, 1982a). Findings were based on multiple regression analyses for the whole sample and on path analyses calculated for upper and lower income children separately.

As Table 2 shows, the U-shaped relationship between income and these problems persisted even in multiple regression estimates that accounted for many other factors, including education, health-related attitudes, housing and neighborhood conditions, family size, and access to medical care. There were similar results for upper and lower income children: compared to those from middle income families, both low and high income children* had higher rates of all three conditions, controlling for other factors. Since these "direct" income effects were independent of all of the variables analyzed, they presumably reflected income-related measures not represented in the regression model. What such measures might be deserves study.

Mechanisms within the model were investigated using path analysis methods to trace the "indirect" effects of income through various mediating variables. Estimates of these effects suggest that different factors were responsible for increased prevalences among high and low income children. For low income children, these included crowded housing conditions, less access to health care, low income neighborhoods, and low education levels among mothers. Two of these--crowded housing and inadequate access--played a dual role: they were consistent mediating factors for the effects of income on all three problems among low income children, and they were also independent determinants of these children's increased prevalences.

For high income children, most of the mechanisms could not be determined, although a few explanations could at least be eliminated--for example, children in affluent families had more health problems than middle income children despite the advantages of less crowded housing, well-to-do neighborhoods, higher levels of mothers' education, and greater access to health care. Two things that did seem to contribute systematically, although probably only slightly, to the increased prevalences among upper income children were small family sizes (in which mothers tended to be older) and greater use of private providers (many of whom were solo practitioners).

The path analysis equations accounted for only a small proportion (4-6%) of the total variation in these three health problems, even though the explanatory factors included many of the major categories of epidemiological analysis. And, as noted, most of what they did explain was confined to poor children. However, within the range of variation explained, both crowded housing and lack of access to medical care appeared to be consistent risk factors for these three problems among the poor. Both mechanisms are certainly plausible, and directly amenable to policy intervention.

3. Anemia, Race, and Poverty

Another children's health problem addressed in this research was anemia (Dutton, 1979a). Anemia has traditionally been more common among black than white children, since in most samples the hematocrit levels of black children average about two to three percent lower than those of white children.

* High income was defined as greater than 3.5 times the poverty level, corresponding to a 1971 family income of over $14,000 for a family of four; low income was defined as less than 1.5 times poverty, or a family income under $4,000. High and low income children comprised 13 and 41 percent of the sample, respectively.

Table 2. Multiple Regression Estimates of the Independent Association of Various Factors with Children's Health Problems

Independent Variables	Estimated Beta Coefficients in Each Illness Equation		
	Ear Disease	Hearing Loss	Vision Problems
Economic Status			
Family income:			
Low income	.122***	.110**	.065
Middle income (comparison group)	---	---	---
High income	.068**	.060	.126***
Housing crowding (persons/room)	.023	.177***	.092*
Neighborhood income level	-.096***	.020	-.056
Social and Demographic Factors			
Mothers' education	-.003	-.032	-.036
Mothers' preventive health orientation	-.003	.094**	-.002
Number of children	.018	-.159***	-.042
Child's age	-.090***	-.044	-.029
Female child	-.020	.034	-.039
Health Care			
Access to care	-.007	-.070*	-.005
Private health care systems	.027	.045	.017
Past Illness			
Past ear illness	.110***	.124***	---
Past eye illness	---	---	.116***
R^2 (explained variation)	.049	.064	.037
Number of children	1063	672	771

*** p<.01 ** p<.05 * p<.10

Multiple regression equations include the variables listed; see Appendices A and B for coding and mean values.

Source: Dutton, 1982a

Until recently, the relative contributions of economic, nutritional, and genetic factors to these differences were unspecified. However, based on new evidence and reanalysis of past data, some investigators have argued that genetic differences transcend economic status. Separate screening standards have thus been recommended for black children--standards which would define fewer as anemic. Additional arguments favoring lower standards for black children include the fiscal savings which would accrue to publicly-funded nutrition and medical care programs if fewer blacks were referred for treatment, as well as (alleged) social and psychological benefits for individual black children, who would no longer be defined as ill.

The present research discussed various methodological inadequacies in the evidence supporting the separate standards argument. Most notable was the likelihood of significant economic disparities within the racial subgroups compared in all of the major studies. Thus, while racial differentials in hematocrit levels have consistently been reported, it is impossible to determine the extent to which they are due to poverty rather than to race. Multiple regression results for black children in the Washington, D.C. sample illustrated the role of specific risk factors known to be differentially distributed by income (e.g., multiparity, birthweight, source of medical care). Such poverty-related factors were associated with varying hematocrit levels, even among black children, and appeared to account for a large part of the black-white hematocrit differentials. For example, if black children in the study sample had had the same average values as white children on various social and economic measures, the average expected hematocrit levels for these black children would have been significantly above their actual levels, and slightly higher than those of the white children in the sample. While these findings do not disprove the possible genetic basis of hematocrit differences, they strongly suggest that separate standards are not justifiable on the basis of current scientific evidence.

B. Differential Access to Services and Quality of Care

Few empirical investigations permit systematic comparison of multiple effects of widely-varying delivery systems within a single population sample. This research provided such a comparison, describing their impact on both health outcomes (Dutton and Silber, 1980) and service utilization (Dutton, 1979b 1981, 1982a). The settings represented were solo practice, fee-for-service group practice, prepaid group practice, public clinics, hospital outpatient departments, and an emergency room. The findings revealed little relation between the health outcomes in different settings compared with levels of utilization.

1. Children's Health Outcomes in Different Ambulatory Care Settings

Health outcomes were inferred from differences between actual illness prevalences in each setting compared with the prevalences that would have been expected given the composition of that setting's patient clientele. Data on actual illness prevalences were from the clinical examinations conducted by study physicians and included five conditions: iron-deficiency anemia, acute ear infections, chronic ear problems, residual hearing loss, and vision disorders. These conditions were selected as indicators of the health care system's effectiveness in performing various functions, including prevention, screening, case management and referral (Kessner, et al., 1973).

Expected illness prevalences were calculated from these data, based on the children's individual and family characteristics. Using multiple regression results for the entire sample, each child's expected illness probability was estimated as a function of various individual and family characteristics. The sum of these probabilities for children using each setting gave the expected prevalence for those settings, adjusted for the varying mix of patients. Comparing the expected and actual prevalences across settings provided an indirect assessment of system performance.

These comparisons, shown in Table 3, revealed three consistent patterns: children using solo practitioners had generally higher-than-expected illness prevalences, while those using the prepaid group and hospital outpatient departments had uniformly lower-than-expected prevalences. These differentials were not related to patients' economic status, nor could they be explained by selective identification of particular providers based on recent children's health problems (for instance, the possibility that mothers whose children had not been ill recently might have named a hospital outpatient department as a usual source simply because no others came to mind.) Moreover, for the prepaid group and solo practice, the disparity between actual and expected prevalences was generally stronger among more exclusive users of each setting. These three patterns thus appeared to represent the effects of organizationally-based differences in the quality of health care functions performed in each setting. Although the differentials were small and not all were statistically significant, their consistency was noteworthy.

2. Patterns of Ambulatory Care in Different Settings

The effects of health care settings on utilization of services were investigated in two different ways: the first estimated the net impact of different types of settings on patients' use, while the second assessed the individual effects of particular system features on utilization. In both cases, analyses were adjusted statistically for varying patient group characteristics. Measures of use were based on information reported in the household survey and included multiple measures for both children and adults. Utilization controlled largely by patients--preventive checkups and the initial decision to seek care for an episode of illness--was distinguished from that controlled primarily by physicians--follow-up visits and medication. The distinction between patient and provider control, although often ignored in empirical research (witness the number of studies analyzing annual physician visits), is essential in analyzing the impact of health care settings, since their attributes may affect patients and physicians quite differently.

The study sample exhibited the traditional dual system of medical care in which the poor and minorities were more likely to use various "public" settings--often hospital clinics--for primary medical care, while the more affluent used private providers. As Table 4 shows, the public settings had the lowest rates of patient-initiated use, including both preventive care and initial diagnostic visits. The prepaid system, in contrast, maximized patients' access to both preventive and diagnostic care. And despite whatever economic incentives providers may have had to limit the volume of services, the prepaid system did not seem to inhibit physician-controlled follow-up care.

Table 3. Ratio of Actual to Expected Prevalences of Selected Health Problems Among Children with Different Usual Sources of Ambulatory Care

Children's Health Problems	Usual Source of Care					
	Solo Physicians	FFS Groups	Prepaid Group	Public Clinics	Hospital OPDs	Hospital ER
Anemia	1.11	.46	.95	1.14	.98	--*
Acute Ear Infections	.96	.95	.92	1.09	.95	1.16
Chronic Ear Problems	1.40	1.14	.96	.85	.80	.53
Hearing Loss	1.28	.63	.97	.85	.93	1.27
Vision Problems	1.10	1.22	.81	.95	.97	1.03

FFS: fee-for-service; OPD: outpatient department; ER: emergency room

Expected prevalences calculated from regression equations containing variables in Appendix B.

* Too few cases to report.

Source: Dutton and Silber, 1980

Table 4. Adjusted Use Rates in Different Ambulatory Care Settings: Rates Predicted for a Typical Person or Family

Dependent Variables: Adjusted Use Rates	Usual Source of Care				
	Solo Physicians	FFS Groups	Prepaid Group	Public Clinics	Hospital OPD/ER
PATIENT-CONTROLLED					
Preventive Care					
Frequency of checkups:					
Respondents	1.73	1.74	1.83	1.57*	1.54*
Children	2.46	2.68*	3.07**	2.73**	2.16**
Initiation of Care					
Probability of visits in 6 months:					
Adults	.31	.37	.48**	.14**	.21*
Children	.70	.67	.86**	.74	.75
Probability that child ever had hearing or ear exam	.48	.48	.73**	.49	.48
Probability that child ever had vision or eye exam	.38	.40	.59**	.33	.33
Probability that child saw doctor for past ear problem	[illegible]	.81	.94*	.86	.84
PHYSICIAN-CONTROLLED					
Follow-Up Care					
Number follow-up visits/ condition in 6 months:					
Adults	3.9	4.5	3.8	3.2	2.4*
Children	0.9	2.2*	1.7	1.1	1.8*
Medication					
Probability that medication was prescribed to family in 6 months	.75	.77	.74	.71	.78

All significance statistics pertain to the differences estimated between each of the systems compared with solo practice. Findings are adjusted for the variables indicated in Appendix B. Boxes designate patterns of consistent or significant findings.

** p<.01 * p<.10

Source: Dutton, 1979b

Many of the public settings in this study sample presented significant barriers to access. The hospital outpatient departments had high charges for services, long office waiting times, limited hours, inadequate off-hours coverage, and relatively long distances for patients to travel. The public clinics--city and volunteer well-child and family clinics--had no financial barriers, but did have a number of organizational barriers to access, such as limited hours, long office waiting times, and fragmentation of care. Scheduled appointments were offered in relatively few public or hospital clinics, even though they tended to reduce office waiting times and to promote access. The three private settings were generally more organizationally accessible, and the prepaid group was financially accessible as well. Thus, in this study as in many others, those with the greatest medical needs and the fewest personal resources faced the most substantial barriers to access.

The results also suggested some perverse effects of fee-for-service payment: patients, especially poor patients, appeared to be deterred from seeking preventive and diagnostic care, while physicians were encouraged to expand follow-up services. Moreover, comparing the fee-for-service and prepaid settings, income gradients in both initial and follow-up services were sharper in the fee-for-service than prepaid settings, despite the financial coverage offered by Medicaid and the potential bureaucratic barriers of the prepaid system. There was also less correspondence between use and medical need (reported medical problems) in the fee-for-service settings. By these criteria, services were distributed less equitably relative to both income and medical need in the fee-for-service settings than in the prepaid system.

3. Financial, Organizational, and Professional Determinants of Ambulatory Care

Further analyses provided more detailed information on the role of particular provider and system features, again taking patient characteristics into account. Table 5 shows those features with the strongest estimated deterrent effects on use--high charges for services, absence of Medicaid coverage, long distances for patients to travel, limited clinic or office hours, inadequate off-hours coverage, and sharing of patients among physicians. But the most powerful inhibiting factor of all appeared to be a practice clientele that was largely or entirely low income. People seeing providers with low income practices had lower rates of virtually every measure of use, independent of their own income level and many other patient, provider, and system features. This might reflect inadequate reimbursement levels by Medicaid, larger patient loads, the social gulf between patients and providers, or additional structural barriers not represented in the data--but it is unlikely to reflect lower medical need. A number of these low income practices were in hospital outpatient departments, where the combined impact of various structural barriers reduced the likelihood of patient contacts by roughly 50 percent compared with private settings. As expected, most of these barriers took their greatest toll on patient-initated utilization--preventive care and initial illness visits.

Two such barriers--charges and distance--had a disproportionate impact on the poor. Higher charges were associated with lower use rates among both upper and lower income families, controlling for many factors, including

.ble 5. Estimated Effects of the Most Important Financial, Time, and Organizational Barriers on Patient's Utilization

Dependent Variables	Standardized Beta Coefficients[a] for: Financial Barriers: Provider charges: Poor	Nonpoor	Absence of Medicaid[b]	Time Barriers: Distance to provider[c]: Poor	Nonpoor	Waiting time in office	Organizational Barriers: Inadequate off-hours coverage	Patients shared by doctors	Low income patients only
PATIENT-CONTROLLED									
Preventive Care									
Frequency of checkups:									
Respondents	-.014	-.026	-.053	-.024	.047	-.125***	-.058	-.008	-.070*
Children	-.080**	-.035*	-.043	-.077**	-.009	-.036	-.054*	.074*	-.106***
Initiation of Care									
Any visits in 6 months:									
All family members	-.038*	-.010	-.071***	-.039*	-.003	-.038**	-.017	-.029	-.060**
Children	-.035	-.005	-.068*	-.098*	-.035	-.004	-.005	-.035	-.101***
Child ever had hearing or ear exam	-.065**	-.048*	-.093**	.048	.029	.087***	.020	-.068*	-.080**
Child ever had vision or eye exam	-.109***	-.021	-.076*	.028	.029	-.011	-.089**	-.071*	-.033
Child saw doctor for past ear problem	-.049	-.013	-.005	-.060	-.055	.089*	-.082	-.150**	-.088
PHYSICIAN-CONTROLLED									
Follow-up Care									
Number follow-up visits per condition in 6 months:									
All family members	-.008	-.061*	-.079*	.013	.027	-.003	-.073	-.032	-.065
Children	-.017	-.043	-.010	.062	.068	-.009	-.095	-.008	-.069
Medication									
Medication prescribed in 6 months	-.007	-.063*	.004	-.028*	.078*	.018	.025	.000	.114*

a Based on regression equations containing the independent variables indicated in Appendices B and C.

b Indicates estimated effect of not having Medicaid, other things (including income and private coverage) equal.

c Significance statistics indicate the difference between the estimated effects of distance on the poor compared with the nonpoor; the beta coefficients indicate estimated effects of distance on the poor and nonpoor, respectively.

*** p<.01 ** p<.05 * p<.20

Source: Dutton, 1981

income, Medicaid, and private insurance coverage. However, members of lower income families had greatest reductions in preventive checkups and initial illness visits, whereas the more affluent had greatest reductions in follow-up services and medication. Thus, the poor apparently cut back on services over which they had most control--preventive care and initiation of care--while the nonpoor were able to reduce follow-up care in spite of the influence of providers. The deterrent effects of time and inconvenience in getting to more distant providers were also greater for the poor than the nonpoor, presumably because of more limited mobility.

These findings illustrated the important role of financial, bureaucratic, and professional arrangements in shaping patterns of use. Based on the amount of variance explained, providers and organizations appeared to have more influence over patients' utilization than patients did, not only in follow-up services, but in preventive care and patient-initiated illness care as well.

4. Structural Barriers and Two-Class Care: National Data

During the last decade, national data show that the dual system of care has persisted, notwithstanding the intent of Medicaid to provide "mainstream" care for the disadvantaged. Indeed, poor and minority groups have had the greatest absolute increases over this period in the use of emergency rooms and clinics. Such clinics are typically ill-suited to provide coordinated primary care services. In part because of this dual system, the disadvantaged are less likely to have a regular physician, and face greater financial and organizational obstacles in seeking care. National data show that the lowest income group spends by far the largest share of income on out-of-pocket medical expenses, despite Medicaid and other public programs. The process of obtaining care is also more time-consuming and inconvenient for the poor and minorities: they spend more time getting to their regular providers, wait longer before being seen, and are less likely to have access to weeknight or weekend office hours, house calls, or telephone contacts (Dutton, 1981). Furthermore, data from both national surveys and the study sample indicate that even within the same practice settings, low income patients often face greater barriers than the more affluent and receive a different level of care.

IV. SUMMARY AND CONCLUSIONS

These findings reveal substantial inequalities in both health and access to care for the disadvantaged. By most measures, low income and minority children are in worse health than the rest of the population, and receive fewer medical services. The correlation between income and race is sometimes difficult to disentangle. For example, while anemia is more common among black than white children, study results indicate that this may be partly due to economic disparities between the racial groups compared. A few conditions, such as certain ear and vision problems, demonstrate a more complex, U-shaped relation to socioeconomic status. The reasons for higher prevalences of these conditions among upper income children could not be determined, but two possible contributing factors among poor children appeared to be crowded housing and less access to medical care. Both are amenable to policy intervention: inadequate access through publicly-supported health care or financing; and crowded housing through social programs or subsidies. If results from this research are generalizable, such policy approaches could lead to reduced illness among poor children.

Patterns of health outcomes and service utilization showed little correspondence across practice settings. Children using hospital outpatient departments and those using the prepaid group had better than average outcomes for ear, hearing, and vision problems. However, these two settings had opposite effects on utilization: rates of preventive services and initial illness visits were highest in the prepaid group and lowest (at least for children) in the hospital clinics. Furthermore, patients of solo physicians had generally worse than expected health outcomes, but intermediate levels of adjusted utilization.

These findings present a paradox: overall, lower utilization of medical care appeared detrimental to poor children's health, yet the utilization levels in different settings evidently had less to do with health outcomes for these particular problems than did other aspects of provider behavior or system organization. It may be that these other provider or system differences accounted in part for the relatively low proportion of variation explained in the health measures. Future investigation of the determinants of children's health might fruitfully explore such differences and their implications for the relationship between access and health. These are critical issues for the design of equitable, effective, and efficient health care systems.

The public debate on health policy now focuses more on efficiency than equity. Current policy trends, including reductions in Medicaid and other public programs, increased cost-sharing for patients, eligibility and coverage restrictions, and negotiated Medicaid contracts with low-bid providers, are intended to decrease the costs of publicly-funded health care for the poor by reducing "unnecessary" services and "inefficient" care. Yet, based on this study's findings, their impact could be counterproductive. Poor and minority groups already have the lowest rates of utilization relative to indicators of medical need, bear the largest financial burden of medical costs, and face the greatest structural barriers to access. Furthermore, additional cost-sharing and eligibility restrictions for Medicaid patients are likely to discourage mainly patient-initiated preventive and diagnostic services. Likewise, by segregating the poor into selected practices, negotiated Medicaid contracts could have a similar or greater deterrent effect (especially given the cost-cutting incentives built into contracts). The resulting reductions in utilization are likely to exacerbate present deficiencies in illness prevention and early diagnosis.

Ultimately, it may be both inefficient and unequitable to neglect the health of the disadvantaged, particularly children. Short-term savings in the costs of public programs may be trivial compared to the long-run costs of lowered productivity due to impaired health and the expense of caring for subsequent medical complications. In this era of cost-consciousness, there is greater reason than ever to distribute health care according to medical need. Efficiency and equity converge.

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Appendix A. Dependent Variables: Children's Health Problems and Measures of Patients' Utilization

HEALTH PROBLEMS	Coding (or Range)	Number of Cases	Mean Value	Amount of Variance Explained (R^2) [a]	Appears in Reference [b]
Anemia: Difference between child's hematocrit value and the relevant age-sex cutoff value [c]	0 = normal 2-9% = anemic (actual hematocrit difference)	282	.15	.09-.15	3,5
Ear Disease: Any acute or chronic middle ear condition in one or both ears	0 = normal 1 = any ear problem	1063	.25	.05	7
Acute Ear Infections: Acute condition in one or both ears, excluding children with chronic problems only	0 = normal 1 = acute ear infection	1092	.23	.06	5
Chronic Ear Problems: Chronic condition in one or both ears, excluding children with acute infections	0 = normal 1 = chronic ear problem	613	.09	.13	5
Hearing Loss: Unilateral or bilaterial loss in speech or nonspeech range, excluding children with current middle ear disease	0 = normal 1 = hearing loss	672	.14	.06-.14	5,7
Vision Problems: One or more of three defects, distance acuity deficiency (with glasses), motility defects, organic problems	0 = normal 1 = any vision problem	771	.28	.04-.09	5,7
SERVICE UTILIZATION					
Patient-Controlled:					
Preventive Care					
Frequency of checkups:					
Respondents	number of checkups reported (0-2)	679	1.50	.16-.19	4,6,8
Children	1 = never 2 = when needed 3 = every year 4 = every 6 months	1206	2.60	.24-.27	4,6,8

(continued)

	Coding (or Range)	Number of Cases	Mean Value	Amount of Variance Explained[a] (R^2)	Appears in Reference
Initiation of Care					
Any visits to usual provider in last 6 months by:					
All family members	0 = no, 1 = yes	3033	.43	.14-.19	4,6,8
Children	0 = no, 1 = yes	1206	.57	.25-.29	4,6,8
Has child ever had a (nonschool) hearing or ear exam?	0 = no, 1 = yes	1206	.43	.21-.24	4,6,8
Did child ever have a (nonschool) vision or eye exam?	0 = no, 1 = yes	959	.29	.14-.15	4,6,8
Did child see a doctor for a past ear problem?	0 = no, 1 = yes	371[c]	.75	.12-.18	4,6,8
Physician-Controlled:					
Follow-up Care					
Number of follow-up visits to usual provider per condition in last 6 months:					
All family members	number of visits after first	690	3.10	.12-.14	4,6,8
Children	number of visits after first	415	2.77	.10-.13	4,6,8
Medication					
Was medication prescribed for any family members in last 6 months?	0 = no, 1 = yes	573[d]	.76	.08-.12	4,6,8

[a] R^2 indicates the proportion of variation in each measure explained by an additive equation containing the independent variables indicated in Appendices B and C. A range is indicated when more than one explanatory equation was estimated.

[b] Numbers refer to papers listed in the References.

[c] Differences were coded positive (i.e., the lower the child's hematocrit, the larger the difference). Cutoffs were set at one standard deviation below age-sex mean values for the sample. In Reference 3, the actual hematocrit value is used rather than this age-sex adjusted difference. Mean value listed is percent defined as anemic.

[d] Asked only of families which had more than one visit to usual provider in last six months; the estimating equation included controls for two indicators of illness severity (children's illness index, and average number of follow-up visits per condition).

Appendix B. Independent Variables in Regression Equations Estimating Children's Health Problems, Ambulatory Use

Variable Description	Coding	Mean Value	Appears in Reference
Report Past Illness			
Child's illness index (a weighted proportion of the following: prematurity, ear problem, hearing test failure, eye problems, vision test failure, sinus trouble, hay fever, asthma, eczema, hives, chronic food allergy, more than 3 colds/year)	continuous index, from 0 = no problem, to 1 = all problems	.11	4,6,8
Child's ear illness (based on ear problems and hearing test failure)	0 = no problem, to 1 = both	.21	4-8
Child's eye illness (based on eye problems and vision test failure)	0 = no problem, to 1 = both	.21	4-8
Was infant premature?	0 = no, 1 = yes	.21	3,5
Does adult have a current medical or health problem?	0 = no, 1 = yes	.10	4,6,8
Demographic Factors and Family Structure			
Individual's age (years)	age; age^2; or 1/(age + 0.5)	17.4[a]	4-8
Individual's sex	0 = male, 1 = female	.49	4-8
Motherhood (age-sex interaction)	1=female aged 15 to 45 years	.24[b]	
	0=other females and all males	--	4,6,8
Age of head-of-house (years)	age	34.3	4,6,8
Sex of head-of-house	0 = male, 1 = female	.31	5,6,8
Mother's age at child's birth:			
under 21 years	0 = no, 1 = yes	.25	5
21-31 years	omitted category	.68	5
over 31 years	0 = no, 1 = yes	.16	5
Family size	number of children	2.7	4-8
First-born child	0 = subsequent child 1 = first born child	.38	4,5,6,8
Economic Status			
Family income (ratio to poverty level)	0 = below poverty, to 7 = 7 times poverty level	2.1	4,6,8
Low income (<1.5 times poverty)	0 = no, 1 = yes	.44	5,7
Middle income (1.5-3.5 times poverty	(ommitted category)	.45	5,7
High income (>3.5 times poverty)	0 = no, 1 = yes	.11	5,7
Occupation of head-of-house	0 = white collar 1 = blue collar	.56	4,6,8
Housing crowding	number of persons/room	.75	5,7

(continued)

Variable Description	Coding	Mean Value	Appears in References
Neighborhood income (Median Census Tract income)	$7,595-$21,129	$10,120	5,7
Social Factors			
Education of respondent (years of school)	1=<8, 2=9-11, 3=12, 4=13-15, 5=16+	2.8	4,6,7,8
Race	0=white, 1=black	.93	4,5,6,8
Length of residence in D.C.	number of years	19.0	4
Frequency of religious attendance	1=never, to 6=>once/week	3.5	5
Financial Coverage			
Private health insurance	0 = no, 1 = yes	.71	4,6,8
Public assistance	0 = no, 1 = yes	.27	4,6,8
Health Attitudes of Respondent			
Belief in preventive care (index based on 3 questions on value of asymptomatic checkups)	1=low, to 4=high	3.2	4-8
Tendency to consult a physician (average of responses to 7 questions on illness symptoms and how likely respondent would be to consult doctor for each)	1=very unlikely, to 4=very likely	3.0	4,6,8
		3.0	4,6,8
Salience of health (frequency of discussion about health matters)	1=never, to 4=very frequently	1.9	4,6,8
Professional health orientation (index based on thermometer ownership and use)	1=don't own thermometer, 2=own but don'e use regularly 3=own and use before calling M.D.	2.3	4,6,8
Social alienation (index based on Srole's anomie measures)	0=not alienated, to 1=very alienated	.62	4,6,8
Use of Services			
Frequency of children's preventive checkups	0=never, 1-when needed, 2=regularly every year, 3-regularly every 6 mos.	2.50	5
Adequacy of respondent's prenatal care (based on months pregnant before seeking care, frequency of visits and source of care)	1=low to 3=high	2.44	5
Has child seen a provider in last 6 months?	0 = no, 1 = yes	.62	5
Has child had non-school hearing test?	0 = no, 1 = yes	.43	5
Has child had non-school vision test?	0 = no, 1 = yes	.29	5
Continuity-of-care index: % of all visits in 6 mos. to usual provider	0-100%	84%	5

Variable Desription	Coding	Mean Value	Appears in References
Usual Source of Health Care			
Fee-for-service solo practice	0 = no, 1 = yes	.27	4,5
Fee-for-service group practice	0 = no, 1 = yes	.10	4,5
Prepaid group practice	0 = no, 1 = yes	.10	4,5
Public clinic	0 = no, 1 = yes	.27	4,5
Hospital OPD	0 = no, 1 = yes	.22	4,5
Hospital ER	0 = no, 1 = yes	.04	4,5
Public or private health care provider	0 = hospital or public clinic; 1 = fee-for-service or prepaid practice	.43	7

[a] This is the mean value for the age of all family members.

[b] This is the percent of women in this age group (relative to the entire sample of both males and females).

Appendix C. Independent Variables Representing Health Care System Features in Regression Equations Estimating Patients' Utilization

Variable Description	Coding (Range)	Mean Value	Appears in References
Financial Barriers			
Provider charge index, based on average charges for pediatric exam, treatment of ear infection, urinalysis, hemoglobin and throat culture: nonpoor families	value of charges averaged over listed services 0 - $15.28	$4.42	6,8
Provider charge index (as above): poor families[a]	0 - $15.28	$4.56	6,8
Absence of Medicaid coverage	0 = Medicaid 1 = no Medicaid	.73	6,8
Time Barriers			
Distance to provider: nonpoor families[b] (miles)	0-12	2.9	6,8
Distance to provider: poor families (miles)	0-10	1.5	6,8
Waiting time in provider's office (minutes)	0-95	35.2	6,8
Organizational Barriers			
Proportion of patients seen by appointment	1=none, 2=less than half, 3=about half, 4=more than half, 5=all	3.1	6,8
Days waited to be seen or for an appointment	0-95	9.6	6,8
Number of hours per week clinic or office is closed	0-160	120.0	6,8
Inadequacy of coverage during off-hours	1=very adequate (coverage by MDs in this or other practice) 2=adequate (answering service or referral to ER) 3=inadequate (no formal arrangements)	1.8	6,8
Practice Patterns			
Patients shared among physicians	1=none (solo practice) 2=some (share personnel and/or facilities) 3=routine (share patients with other MDs)	2.1	6,8
Proportion of patients not using practice as regular source of care	1=0-25%, 2=25-50%, 3=50-75%, 4=75-100%	1.3	6,8
Low income families only in practice	0=mixed income levels 1=low income only	.50	6,8

(continued)

	Coding (Range)	Mean Value	Appears in References
Demographic Factors			
Physician's sex (or % female)[c]	0=male, 1=female	.19	6,8
Physician's race (or % black)	0=white, 1=black	.32	6,8
Training and Experience			
Number of years in practice	3-54	21.5	6,8
Physician still in training?	0=no, 1=yes	.12	6,8
Length of residence (years)	0-8	1.95	6,8
Attitudes			
Physician's general satisfaction with practice	1=not satisfied 2=satisfied 3=very satisfied	2.3	6,8
Preventive medcial orientation: % of MD reports of routine screening for vision, hearing, and blood disorders during pediatric exams	0-100%	41%	6,8

[a] Separate charge index terms were defined for poor (family income < twice poverty) and nonpoor (income ≥ twice poverty) families. Twice poverty was used as the cutoff instead of poverty in order to have an adequate number of low income families using fee-for-service providers.

[b] Distance was defined as number of miles to the usual provider for persons of all income levels; a dummy variable, defined as distance for persons at or below poverty and as zero for all nonpoor persons, indicated the differential effect of distance on the poor. Significance statistics for the distance-poor term thus indicate the significance of this differential effect.

[c] When only an organization was listed as the source, physician's sex was coded as 0=all male, .5=both male and female, and 1=all female.